General

Guideline Title

Best evidence statement (BESt). Screening of hypertension in pediatric patients with diabetes.

Bibliographic Source(s)

Cincinnati Children's Hospital Medical Center. Best evidence statement (BESt). Screening of hypertension in pediatric patients with diabetes. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2011 Apr 5. 12 p. [7 references]

Guideline Status

This is the current release of the guideline.

Recommendations

Major Recommendations

The strength of the recommendation (strongly recommended, recommended, or no recommendation) and the quality of evidence (1a-5b) are defined at the end of the "Major Recommendations" field.

1. It is recommended that patients with diabetes ≥3 years of age be screened for hypertension at each clinic visit (Local Consensus, 2010 [5]; American Diabetes Association [ADA], 2010 [5a]; Kavey et al., 2006 [5a]; National High Blood Pressure Education Program Working Group [NHBPEPWG], 2004 [5b]) and receive appropriate follow-up if the blood pressure is ≥90th percentile by sex, age and height (see management algorithms in the original guideline document).
2. It is recommended to determine blood pressure percentile by sex, age and height percentile (NHBPEPWG, 2004 [5b]). (See Appendix 1 in the original guideline document.)
3. It is recommended that if blood pressure (systolic or diastolic) is:
    a. <90th percentile by sex, age and height (normal), no intervention is needed
    b. ≥90-95th percentile by sex, age and height percentile (prehypertensive range) (See Algorithm 1 in the original guideline document for diagnosis and management.)
    c. Between the 95th-99th percentile by sex, age and height percentile (stage 1 hypertension range) (See Algorithm 2 in the original guideline document for the diagnosis and management.)
    d. ≥ the 99th percentile + 5mmHg by sex, age and height (stage 2 hypertension range) (See Algorithm 3 in the original guideline document for the diagnosis and management.)
    Note: For any of the above hypertension diagnoses, you must have abnormal blood pressure readings on three separate occasions. (See algorithms in the original guideline document for details.)

    (Local Consensus, 2010 [5]; ADA, 2010 [5a]; Kavey et al., 2006 [5a]; NHBPEPWG 2004 [5b])

4. It is recommended that treatment of blood pressure (systolic or diastolic blood pressure) ≥ the 90th percentile for age, sex, and height include dietary intervention (see Appendix 2 in the original guideline document) and exercise aimed at weight control and increased physical activity, as appropriate (Local Consensus, 2010 [5]; ADA, 2010 [5a]; Kavey et al., 2006 [5a]; NHBPEPWG, 2004 [5b]).
5. It is recommended that if target blood pressure (<130/80 or < the 90th percentile for age, sex, and height, whichever is lower) is not reached within 6 months of dietary intervention, pharmacologic treatment be initiated (Local Consensus, 2010 [5]; ADA, 2010 [5a]; Kavey et al., 2006 [5a]; NHBPEPWG, 2004 [5b]).
6. It is recommended that if blood pressure (systolic or diastolic) is ≥ the 95th percentile for age, sex and height or ≥130/80 mmHg, pharmacologic therapy be initiated as soon as the diagnosis is confirmed (Local Consensus, 2010 [5]; ADA, 2010 [5a]; Kavey et al., 2006 [5a]; NHBPEPWG, 2004 [5b]).
7. It is recommended that if a diagnosis of prehypertension (≥90th percentile) or hypertension (≥95th percentile) is confirmed, the following screening labs be drawn to rule out secondary hypertension: basic metabolic panel, complete blood count and urinalysis (NHBPEPWG, 2004 [5b]).

Definitions:

Table of Evidence Levels

Quality Level	Definition
1a† or 1b†	Systematic review, meta-analysis, or meta-synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain
4a or 4b	Weak study design for domain
5 or 5a or 5b	Other: General review, expert opinion, case report, consensus report, or guideline

†a = good quality study; b = lesser quality study

Table of Recommendation Strength

Strength	Definition
"Strongly recommended"	There is consensus that benefits clearly outweigh risks and burdens (or visa-versa for negative recommendations).
"Recommended"	There is consensus that benefits are closely balanced with risks and burdens.
No recommendation made	There is lack of consensus to direct development of a recommendation.
Dimensions: In determining the strength of a recommendation, the development group makes a considered judgment in a consensus process that incorporates critically appraised evidence, clinical experience, and other dimensions as listed below.	
1. Grade of the Body of Evidence (see note above) 2. Safety/Harm 3. Health benefit to patient (direct benefit) 4. Burden to patient of adherence to recommendation (cost, hassle, discomfort, pain, motivation, ability to adhere, time) 5. Cost-effectiveness to healthcare system (balance of cost/savings of resources, staff time, and supplies based on published studies or onsite analysis) 6. Directness (the extent to which the body of evidence directly answers the clinical question [population/problem, intervention, comparison, outcome]) 7. Impact on morbidity/mortality or quality of life	

Clinical Algorithm(s)

Algorithms are provided in the appendices of the original guideline document for:

- Pre Hypertension Algorithm 1: (BP ≥90-95th %ile) - T1DM or type T2DM
- Stage 1 Hypertension Algorithm 2: (BP ≥95-99th %ile) - T1DM and T2DM
- Stage 2 Hypertension (greater than ≥99th %ile + 5mmHg) Algorithm 3 - T1DM and T2DM

Scope

Disease/Condition(s)

Diabetes

Other Disease/Condition(s) Addressed

Hypertension

Guideline Category

Diagnosis

Management

Screening

Clinical Specialty

Cardiology

Endocrinology

Family Practice

Internal Medicine

Pediatrics

Intended Users

Advanced Practice Nurses

Nurses

Physician Assistants

Physicians

Guideline Objective(s)

To evaluate in pediatric patients (ages 3 to 18 years) with diabetes what is the optimal screening of hypertension in children and adolescents to reduce the risk of cardiovascular complications

Target Population

Pediatric patients (ages 3 to 18 years) with diabetes

Interventions and Practices Considered

Diagnosis/Management/Screening

1. Screening for hypertension at each clinic visit
2. Determine blood pressure percentile
3. Dietary interventions and exercise
4. Pharmacologic treatment
5. Laboratory parameters, including basic metabolic panel, complete blood count, and urinalysis

Major Outcomes Considered

Risk of cardiovascular complications

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Search Strategy

1. Initial search
    a. DATABASE: Ovid: Medline
    b. OVID FILTERS
        i. Publication dates: 1996 to May 21, 2010
        ii. Limits: English language, all child (0 to 18 years)
    c. SEARCH TERMS & MeSH TERMS exp *Diabetes Mellitus/ AND exp blood pressure/ AND exp children / search results filtered for: diagnosis subheading OR treatment outcome.mp.
2. Search for synthesized evidence
    a. DATABASE: Ovid: Medline
    b. OVID FILTERS
        i. Publication dates: 1996 to Mar 3, 2010
        ii. Limits: English language, All child (0 to 18 years)
        iii. Publication type: (guideline or meta-analysis or practice guidelines or systematic review).pt. or "the cochrane library".jn. or "cochrane database of systematic reviews".jn.
    c. SEARCH TERMS & MeSH TERMS exp Diabetes Mellitus/ or Diabetes Mellitus, Experimental/ or Diabetes, Gestational/ or Diabetes Insipidus, Neurogenic/ or Diabetes Complications/ or Diabetes Insipidus, Nephrogenic/ or Diabetes Mellitus, Lipoatrophic/ or "National Institute of Diabetes and Digestive and Kidney Diseases (U.S.)"/ or Diabetes Insipidus/

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Table of Evidence Levels

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Methods Used to Analyze the Evidence

Systematic Review

Description of the Methods Used to Analyze the Evidence

Three main guidelines were identified: 1) the American Heart Association (AHA) Scientific Statement entitled Cardiovascular Risk Reduction in High-Risk Pediatric Patients, 2) Treatment guidelines from the American Diabetes Association (ADA) regarding children and adolescents, and 3) Diagnosis, Evaluation and Treatment guidelines from the National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents (The Fourth Report). These guidelines were appraised using the AGREE (Appraisal of Guidelines for Research and Evaluation) instrument, and the results by domain were:

AGREE Domains	ADA	AHA	Fourth Report
Scope and Purpose	100%	52%	64%
Stakeholder Involvement	53%	67%	33%
Rigor of Development	59%	81%	39%
Clarity and Presentation	81%	86%	77%
Applicability	15%	56%	17%
Editorial Independence	100%	72%	17%

These three guidelines have clear pediatric-focused recommendations that are not directly based on evidence-based outcome data but were generated by consensus expert opinion or extrapolation from adult evidence. The recommendations developed for this best evidence statement (BESt) are primarily based on a combination of local consensus and recommendations from the AHA guidelines, ADA guidelines, and The Fourth Report.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Not stated

Rating Scheme for the Strength of the Recommendations

Table of Recommendation Strength

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No recommendation made	There is lack of consensus to direct development of a recommendation.
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1. Grade of the Body of Evidence (see note above) 2. Safety/Harm 3. Health benefit to patient (direct benefit) 4. Burden to patient of adherence to recommendation (cost, hassle, discomfort, pain, motivation, ability to adhere, time) 5. Cost-effectiveness to healthcare system (balance of cost/savings of resources, staff time, and supplies based on published studies or onsite analysis) 6. Directness (the extent to which the body of evidence directly answers the clinical question [population/problem, intervention, comparison, outcome]) 7. Impact on morbidity/mortality or quality of life	

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Peer Review

Description of Method of Guideline Validation

Reviewed against quality criteria by two independent reviewers

Evidence Supporting the Recommendations

References Supporting the Recommendations

American Diabetes Association. Standards of medical care in diabetes--2010. Diabetes Care. 2010 Jan;33 Suppl 1:S11-61. PubMed

Kavey RE, Allada V, Daniels SR, Hayman LL, McCrindle BW, Newburger JW, Parekh RS, Steinberger J, American Heart Association Expert Panel on Population and Prevention Science, American Heart Association Council on Cardiovascular Disease in the Young, American Heart Association Council on Epidemiology and Prevention, American Heart Association Council on Nutrition, Physical Activity and Metabolism, American Heart Association Council on High Blood Pressure Research, American Heart Association Council on Cardiovascular Nursing, American Heart Association Council on the Kidney in Heart Disease, Interdisciplinary Working Group on Quality of Care and Outcomes Research. Cardiovascular risk reduction in high-risk pediatric patients: a scientific statement from the American Heart Association Expert Panel on Population and Prevention Science; the Councils on Cardiovascular Disease in the Young, Epidemiology [trunc]. Circulation. 2006 Dec 12;114(24):2710-38. [401 references] PubMed

National High Blood Pressure Education Program Working Group on High Blood Pressure in Children. The fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. Pediatrics. 2004 Aug;114(2 Suppl):555-76. [138 references] PubMed

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

The American Heart Association and the American Diabetes Association emphasize the importance of early recognition of hypertension in children with diabetes. Cardiovascular disease is the major cause of morbidity and mortality for individuals with diabetes and the largest contributor to the direct and indirect costs of diabetes. Hypertension is a common comorbidity that coexists with diabetes and is a clear risk factor for the development of cardiovascular disease. Hypertension is common in youth with diabetes with prevalence reports documenting nearly 30% of youth between the age of 10-19 years having elevated blood pressure. Early education regarding cardiovascular health and early intervention in children with hypertension is critical to improving long term outcomes.

Potential Harms

Not stated

Qualifying Statements

Qualifying Statements

This Best Evidence Statement addresses only key points of care for the target population; it is not intended to be a comprehensive practice guideline. These recommendations result from review of literature and practices current at the time of their formulation. This Best Evidence Statement does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this Statement is voluntary. The clinician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Audit Criteria/Indicators

Chart Documentation/Checklists/Forms

Clinical Algorithm

Patient Resources

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Staying Healthy

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

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Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2011 Apr 5

Guideline Developer(s)

Cincinnati Children's Hospital Medical Center - Hospital/Medical Center

Source(s) of Funding

Cincinnati Children's Hospital Medical Center

Guideline Committee

Not stated

Composition of Group That Authored the Guideline

Group/Team Leader: Amy Sanghavi Shah, MD, Endocrinology

Other Group/Team Members: Nancy Crimmins, MD, Endocrinology; Jessica Gahl, RD, Endocrinology; Karishma Tilton, RN, Endocrinology

James M. Anderson Center for Health Systems Excellence Support Personnel: Eloise Clark, MPH, MBA, Guidelines Program Administrator, Evidence Facilitator; Karen Vonderhaar, MS, RN, Guidelines Program Administrator, Methodologist

Financial Disclosures/Conflicts of Interest

Not stated

Guideline Status

This is the current release of the guideline.

Guideline Availability

Electronic copies: Available from the Cincinnati Children's Hospital Medical Center.

Print copies: For information regarding the full-text guideline, print copies, or evidence-based practice support services contact the Cincinnati Children's Hospital Medical Center Health James M. Anderson Center for Health Systems Excellence at EBDMInfo@cchmc.org.

Availability of Companion Documents

The following are available:

- Judging the strength of a recommendation. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2008 Jan. 1 p. Available from the Cincinnati Children's Hospital Medical Center.
- Grading a body of evidence to answer a clinical question. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 1 p. Available from the Cincinnati Children's Hospital Medical Center.
- Table of evidence levels. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2008 Feb 29. 1 p. Available from the Cincinnati Children's Hospital Medical Center.

Print copies: For information regarding the full-text guideline, print copies, or evidence-based practice support services contact the Cincinnati Children's Hospital Medical Center Health James M. Anderson Center for Health Systems Excellence at EBDMInfo@cchmc.org.

Appendix 1 of the original guideline document contains blood pressure charts for boys and girls by age and height percentile.

In addition, a proposed outcome measure is available in the original guideline document.

Patient Resources

The following is available:

- Hypertension (high blood pressure). Your child's health. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2009 Jul. 1 p. Available from the Cincinnati Children's Hospital Medical Center Web site .

In addition, information for patients on dietary treatment for blood pressure and a healthy heart is available in Appendix 2 of the original guideline document .

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

NGC Status

This NGC summary was completed by ECRI Institute on September 21, 2011.

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